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(62) Document number(s) of the earlier application(s) in
accordance with Art. 76 EPC:
97306495.9 / 0 826 430

(54) Chemically adsorbed film, method of manufacturing the same, and chemical absorption solution used for the same

(57) A chemically adsorbed film is formed on a substrate surface as a coating film, in which film-composing molecules are inclined in a preferable direction and are bonded and fixed to the substrate surface in a predetermined single direction and at one end. A coating film with excellent anti-abrasion properties is provided by adding the same type of a crosslinking agent as a chemical adsorbent in a chemical adsorption solution in film-forming processes, and then by crosslinking adsorbed

molecules. 5 wt.% of $\text{CF}_3(\text{CF}_2)_7(\text{CH}_2)_2\text{SiCl}_3$ (chemical adsorbent), 3 wt.% of hexachlorodisiloxane (crosslinking agent), and 92 wt.% of cyclohexane (nonaqueous solvent; bp. 80°C) are mixed so as to prepare a chemical adsorption solution. The solution is coated on an aluminum substrate in a dry atmosphere, and the solvent is evaporated and removed from the substrate. Thus, a polymer coating film is formed in which molecules are entangled and crosslinked and are covalently bonded to the substrate surface.



FIG. 7(a)

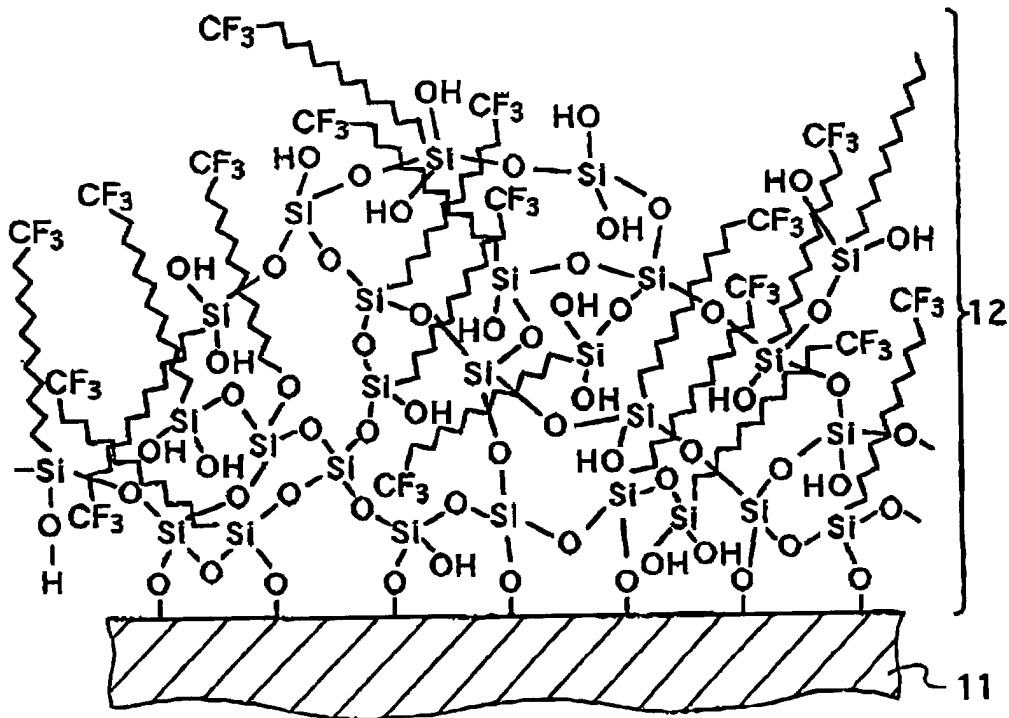


FIG. 7(b)



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 00 10 6173

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
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A	EP 0 599 150 A (MATSUSHITA ELECTRIC IND CO LTD) 1 June 1994 (1994-06-01) * page 3, line 1 - line 11 *	10	
A	EP 0 593 875 A (MATSUSHITA ELECTRIC IND CO LTD) 27 April 1994 (1994-04-27) * page 3, line 50 - line 57 *	10	B05D
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		2 February 2004	Brothier, J-A
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

EPO FORM 1503 03.82 (P04/C01)



CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

- No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

- None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-9 11-24

Method and solution for manufacturing a polymeric chemically adsorbed film which is crosslinked by siloxane bonds, comprising the steps of:

-contacting a substrate, which comprises active hydrogen groups on its surface, with a silane based (chlorosilane or alkoxy silane or isocyanatosilane) adsorption solution, to thus react a substrate surface with molecules of the chemical adsorption solution, and
-evaporating the solvent and then reacting unreacted materials left on the substrate with water.

Chemically adsorbed film comprising molecules covalently bonded to a substrate surface; and wherein said chemically adsorbed film is a monomolecular coating film randomly crosslinked by a plurality of siloxane bonds of remaining groups of polyhalosilane or polyalkoxysilane.

2. Claim : 10

Method for manufacturing a polymeric chemically adsorbed film which is crosslinked comprising the steps of:
-contacting a substrate, which comprises active hydrogen groups on its surface, with a isocyanate based adsorption solution, to thus react a substrate surface with molecules of the chemical adsorption solution, and
-evaporating the solvent and then reacting unreacted materials left on the substrate with water.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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